IFW *AF*
2675

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission 30

Application Number	09/224,696
Filing Date	January 4, 1999
First Named Inventor	Cassondra L. Crotty
Art Unit	2675
Examiner Name	Chante E. Harrison
Attorney Docket No.	BU-9-97-226

ENCLOSURES *(Check all that apply)*

- ☒ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/Declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53

- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
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Remarks:

- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☒ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) (please identify below): 2 Copies of a Technical Declaration; Return Receipt Post Card

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT

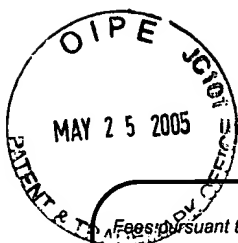| Firm Name	RatnerPrestia		
Signature			
Printed Name	Lawrence E. Ashery		
Date	May 23, 2005	Registration No.	34,515

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Typed or Printed Name	Lawrence E. Ashery	Date	May 23, 2005

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FEE TRANSMITTAL
For FY 2005

Effective on 12/08/04.
Fees pursuant to the Consolidated Appropriations Act. 2005 (H.R. 4818).

☐ Applicant claims small entity status. See 37 CFR 1.27

Complete if Known	
Application Number	09/224,696
Filing Date	January 4, 1999
First Named Inventor	Cassondra L. Crotty
Examiner Name	Chante E. Harrison
Art Unit	2675

TOTAL AMOUNT OF PAYMENT	($) 180.00	Attorney Docket No.	BU-9-97-226

METHOD OF PAYMENT (check all that apply)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	Small Entity Fee ($)	SEARCH FEES Fee ($)	Small Entity Fee ($)	EXAMINATION FEES Fee ($)	Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	_____
Design	200	100	100	50	130	65	_____
Plant	200	100	300	150	160	80	_____
Reissue	300	150	500	250	600	300	_____
Provisional	200	100	0	0	0	0	_____

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)	Multiple Dependent Claims Fee ($)	Fee Paid ($)
_____ - 20 or HP =	_____ x ____	=	_____	____	____

HP = highest number of total claims paid for, if greater than 20

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 3 or HP =	_____ x ____	=	_____

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____ / 50 =	_____ (round up to a whole number) x	____ =	____

4. OTHER FEE(S)

Non-English Specification, $130 fee (no small entity discount)

Other (e.g., late filing surcharge): Additional Appeal Brief Fee

Fees Paid ($) $180

SUBMITTED BY				Complete (if applicable)	
Signature	*[signature]*	(Registration No. Attorney/Agent)	34,515	Telephone	6190-407-0700
Name (Print/Type)	Lawrence E. Ashery			Date	May 23, 2005

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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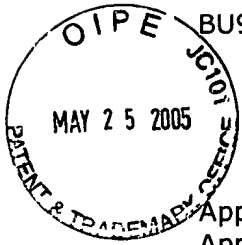
BU9-97-226

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No: 09/224,696
Appellants: Cassondra L. Crotty et al.
Filed: January 4, 1999
Title: METHOD FOR VISUALIZING DATA
TC/A.U.: 2675
Examiner: Chante E. Harrison
Confirmation No.: 3386
Notice of Appeal Filed: July 14, 2003
Docket No.: BU9-97-226

SUPPLEMENTAL APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

S I R :

Responsive to the Official Action dated February 23, 2005, reinstatement of the Appeal for the above identified application is respectfully requested.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1, 2, 4-6, 8-10, 12-14, and 16-20 are pending. Claims 1, 2, 5, 6, 8-10, 13, 14 and 17-20 have been rejected. Claims 4, 8, 12 and 16 have been objected to. Claims 3, 7, 11, and 15 have been cancelled. No claims have been allowed.

IV.   STATUS OF AMENDMENTS

No amendment has been filed subsequent to the close of prosecution.

V.   SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates generally to using graphical computer systems to solve complex mathematical equations and, more specifically, to a method and system for visualizing data.

Appellants' claim 1 relates to a method for visualizing data arrays represented in the form of a plurality of data values. The plurality of data values are initially associated with a mathematical matrix, and these data values are extracted to generate a grid based on the plurality of data values. (Fig. 1, item 102 and page 7, line 12 et seq.). Each data value is then associated with a plurality of geometric shapes according to a predetermined set of rules. (Fig 1, item 104 and page 7, line 20 et seq.). The geometric shapes associated with the data values are placed on the grid. (Fig 1, item 106 and page 8, line 16 et seq.). Finally, the visual and geometric information placed on the grid are reported to a user in graphical form. (Fig. 1 item 108 and page 8, line 21 et seq.).

The user may then take advantage of the capability of a physical design software system to graphically display numerical data arrays. Numerical and structural properties of data arrays may be represented in a form that is recognized by a physical design system. The data array displayed, for example, in a printout makes it possible to visualize properties of a data array.

Claims 5, 9, and 13 recite features similar to claim 1.

Appellants' claim 2 relates to a method for visualizing data arrays represented in the form of a plurality of data values. The plurality of data values are initially associated with a mathematical matrix, and these data values are extracted to generate a grid based on the plurality of data values. (Fig. 2, item 202 and page

9, line 26 et seq.). Numerical attributes associated with the grid's date values are identified (Fig. 2, item 204 and page 9, line 27). Each numerical attribute is associated with a visual attribute (Fig. 2, item 206 and page 9, line 31 et seq.) Geometric shapes are associated with the data values (Fig. 2, item 208, and page 10, line 8). The geometric shapes associated with the data values are placed on the grid. (Fig. 2, item 210 and page 10, line 16 et seq.). Finally, the visual and geometric information placed on the grid are reported to a user in graphical form. (Fig. 2 item 212 and page 10, line 18 et seq.).

Claims 6, 10 and 14 recite features similar to claim 2.

VI.   ISSUES TO REVIEWED ON APPEAL

Claims 1, 2, 5, 6, 9, 10, 13, 14 and 17-20 have been rejected under 35 U.S.C. § 112, first paragraph. Claims 1-3, 5-7, 9-11 and 13-15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schwuttke et al. (U.S. 6,222,547).

VIII. ARGUMENT

Claims 1, 2, 5, 6, 9, 10, 13, 14 and 17-20 have been rejected under 35 U.S.C. § 112, first paragraph. Specifically, the Official Action argues that the claimed features of "mathematical matrix" and "mathematical model" are not supported by the Appellants' specification and were not described at the time of filing. The rejection is respectfully traversed for the reasons set forth below.

In their Response mailed on August 1, 2001, the Appellants first modified the claim term "matrix" with the adjective "mathematical." Specifically, the limitation "extracting a plurality of data values associated with a matrix" was amended to "extracting a plurality of data values associated with a mathematical matrix." Prosecution continued for another twenty months--including a number of Office Actions, Responses, Interviews, and the filing of a CPA--until the Final Office Action dated March 13, 2003 for the first time objected to the claim phrase "mathematical matrix" as improper for introducing new matter.

The undue delay of that objection and the impropriety of the PTO conducting an extensive substantive prosecution with both the appellants and the PTO focusing on the patentability of the specific claim limitation at issue are clear. What makes the impropriety more frustrating to the appellants is that, during an interview, both the Examiner and Supervisory Primary Examiner together suggested revising the claims to replace each first limitation "with the following language: 'extractng [sic] a plurality of data values associated with a mathematical matrix to generate a grid based on a plurality of data values" which would "place the claims in condition for allowance." Interview Summary of December 12, 2002. In their next Response, after the interview, the Appellants followed precisely the suggestion, fully and reasonably expecting an allowance. The unexpected reply by the PTO, however, was the stated objection to the claim phrase "mathematical matrix" as improper for introducing new matter.

Perhaps even more troubling than the delay and waste of resources caused by the "new matter" objection is that the objection is objectively baseless. The general rule regarding new matter is stated in the concluding sentence of 35 U.S.C. § 132: "No amendment shall introduce new matter into the disclosure of the invention." Guidelines for applying that rule are found in 37 C.F.R. § 1.121(a)(6) and in MPEP §§ 608.04, 706.03(o). Specifically, prohibited "new matter" is information "involving a departure from or an addition to the original disclosure." Former Rule 118 (which was transferred "in condensed form" to new Rule 121, Dep't of Commerce, PTO, Changes to Patent Practice & Procedure, 62 Fed. Reg. 53132, 53152 (Oct. 10, 1997)). Amendments that merely clarify or make definite that which an originally filed application expressly or inherently disclosed do not violate the rule against new matter. *Schering Corp. v. Amgen Inc.*, 55 USPQ2d 1650, 1653-54 (Fed. Cir. 2000) ("The fundamental inquiry is whether the material added by amendment was inherently contained in the original application. . . . To make this judgment, this court has explained that the new matter prohibition is closely related to the adequate disclosure requirements of 35 U.S.C. § 112. . . . Thus, to avoid the new matter prohibition, an applicant must show its original application supports the amended matter."); *see generally* 4 D. Chisum, Chisum on Patents, § 11.04 (2002).

The Appellants respectfully submit that the addition of the claim limitation "mathematical" does not constitute new matter for two reasons. First, the

specification, as originally filed, supports that limitation expressly and, if not expressly, at least inherently. Second, the substitution of "mathematical matrix" for "matrix" is, in the context of the present invention, only the permissible substitution of reasonable equivalents. The limitation to a "mathematical" matrix represents subject matter inserted into the claims after the application was filed but which is nevertheless supported by the written description of the application as filed.

The Appellants respectfully submit that the original disclosure is directed entirely to mathematical matrices, and, therefore "mathematical matrices" are disclosed to one skilled in the art, even through the word "mathematical" does not appear immediately before the word "matrix" in the specification. The specification expressly defines "matrices," in the context of the subject invention, as tools used in mathematical analysis: "Matrices are useful constructs both in theoretical and applied mathematical analysis." Specification at page 12, lines 10-11 (emphasis added). The word "mathematical," when added to claims 3, 7, 11, and 15 in the Response dated August 1, 2001, characterized the "matrix" that was already specified by these claims.

The Appellants expressly disclose three, specific mathematical matrices in the specification. In explaining Figure 1, which is a flow chart illustrating steps in a method for visualizing data arrays in accordance with an embodiment of the appellants' invention, the appellants refer to a graphical representation of a dense array shown as a mathematical matrix at page 8, line 3, and in Figure 4. Moreover, both of the examples provided by the appellants to explain their invention expressly incorporate mathematical matrices. See the appellants' specification at page 13, lines 7-11 (first example) and page 15, lines 8-12 (second example).

Submitted with the Response mailed on April 30, 2003 is a second Technical Declaration by Daria R. Dooling, an expert in the field of the present invention. Ms. Dooling's qualifications are set forth in a first Technical Declaration dated June 11, 2002 that was filed with a Response dated June 12, 2002. In the second Technical Declaration, Ms. Dooling (a) states that the original disclosure of the appellants' invention is all about mathematical matrices, (b) recites numerous quotations from the appellants' specification supporting her position, and (c) states that one skilled in the art readily recognizes that the description of the appellants'

invention in the original disclosure describes "mathematical matrices." The limitation to a "mathematical" matrix represents subject matter which an artisan finds supported, inherently if not expressly, by the written description of the application as filed.

The Appellants concede that the specification nowhere mentions the precise phrase "mathematical matrix." The law is clear, however, that amendments which do not directly affect the disclosure of the invention may be permissible even though they add phrases not found explicitly in the original application. *In re Wright*, 145 USPQ 182, 188 (CCPA 1965) (reversing Board's rejection based on new matter, holding that the amendments "merely render explicit what had been implicitly disclosed originally, and, while new *language* has certainly been added, we are not prone to view all new 'language' ipso facto as 'new matter.'"). Such is the present case. Clearly, the limitation characterizing the matrix as "mathematical" is supported by the specification as filed.

Even if the specification did not expressly support that limitation, the claim amendment would not constitute new matter. The substitution of "mathematical matrix" for "matrix" is, in the context of the present invention, only the permissible substitution of reasonable equivalents. One of the dictionary definitions for "matrix" is: "*Math*. A rectangular array of algebraic or numerical quantities treated as an algebraic entity." Webster's II New College Dictionary at 675 (1986). The appeal decided in *Ex parte Heacock*, 134 USPQ 446 (Patent Office Bd. of Appeals 1962), provides both the legal principle governing and support for the substitution.

In Heacock, a reissue claim containing a broader expression encompassing equivalents available to the patentee when he filed the original application was allowed. (Like Section 132, 35 U.S.C. § 251 prohibits introduction of new matter; Section 251 specifically applies to a reissue application.) The original claim characterized a regulating device [matrix, here] as "an electron-discharge device" [unmodified, here]. The patentee amended the claim to include the broader expression "an electronic valve" [a narrower expression "mathematical matrix," here].

The Examiner rejected the amended claim, asserting "that the broader expression 'electronic valve' encompasses semi-conductor devices such as transistors and silicon control rectifiers, for example, all available to appellant when he filed his original application, and that such devices should have been positively disclosed therein if appellant contemplated their use in the system disclosed." Heacock at 447. The Board of Appeals reversed the rejection, stating: "the substitution of semi-conductors and similar devices [mathematical matrix, here] for the regulator tube or electron discharge device [matrix, here] originally disclosed and claimed would involve only the substitution of reasonable equivalents." Id. Thus, the amendment was allowed and the reissue application granted. The present amendment is similarly proper.

Claims 1-3, 5-7, 9-11, and 13-15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,222,547 issued to Schwuttke et al. The rejection is respectfully traversed for the reasons set forth below.

Schwuttke et al. disclose a method and apparatus for monitoring systems and, through a user interface, displaying the real-time data characteristic of the status of the systems in a three-dimensional, simulated, cyberspace representation. This display depicts the data in the form of graphic symbols or objects positioned within the three-dimensional virtual universe, allowing a human user to assimilate and comprehend large quantities of data rapidly. In essence, the method and apparatus present a visual abstraction of data. The data are described throughout the Schwuttke et al. patent as "telemetry data." The dictionary defines "telemetry" as "The science and technology of automatic data measurement and transmission, as by wire or radio, from remote sources, such as space vehicles, to a receiving station for recording and analysis." Webster's II New College Dictionary at 1134 (1986).

The present invention, as recited in independent claims 1, 2, 5, 6, 9, 10, 13 and 14, contains at least one feature which is neither disclosed nor suggested by Schwuttke et al. Specifically, the very first limitation recited in each claim is "extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values." (Emphasis added.) The highlighted limitation is described throughout the specification. *See, e.g.,* page 11,

lines 5-9, of the present application (considering the case of an integrated circuit layout, "numerical data values are obtained by extracting power buses and network resistance from the integrated circuit layout. The numerical data values thus obtained may then be organized in a data array such as a matrix."). Thus, the appellants' claimed invention is directed to a method and apparatus for solving complex mathematical equations which start by extracting data values associated with a mathematical matrix.

The Schwuttke et al. reference neither expressly nor under principles of inherency discloses the highlighted limitation. Rather than begin with extracting data values associated with a mathematical matrix, the method and apparatus of Schwuttke et al. start by monitoring telemetry data. The starting point of the Schwuttke et al. method and apparatus is completely different from the claimed starting point of the appellants' invention because the field of the Schwuttke et al. method and apparatus is completely different from the field of the appellants' claimed invention. Schwuttke et al. monitor and display telemetry data; in contrast, the applicants claim a method and apparatus for solving complex mathematical equations expressed in the form of a mathematical matrix. Accordingly, the applicants respectfully submit that the Schwuttke et al. reference does not anticipate any of the pending claims.
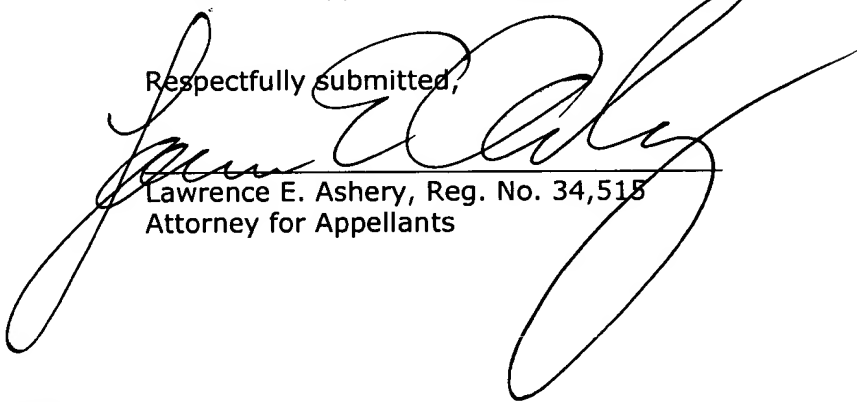
Nowhere do Schwuttke et al. teach extracting data from a mathematical matrix. Nor has the Examiner ever suggested otherwise. In fact, during the Interview on December 9, 2002, the Examiner and SPE agreed that this limitation distinguished the cited reference. The Examiner has simply negated the limitation as "new matter," then found the remainder of the claims (without this limitation) anticipated. Without addressing whether a claim lacking the "mathematical matrix" limitation is patentable over the reference, because such is unnecessary for this appeal, the appellants point out that the Examiner's substantive patentabilty determination hinges on the "new matter" objection. Thus, if "mathematical matrix" is not new matter, then the pending claims are patentable.

Therefore, for the reasons set forth above, claims 1, 2, 5, 6, 9, 10, 13 and 14 are not subject to rejection under Section 102(e) as being unpatentable over the disclosure of Schwuttke et al.

Claim 3, although rejected, is not pending. Claims 16-20 are not mentioned in the PTO's rejection statement. But these claims are patentable by virtue of their dependency on allowable independent claims. Claims 4, 8, 12, and 16 were indicated as being allowable if rewritten into independent form. These claims, however, depend from claims 1, 5, 9, and 13, respectively. These dependent claims are also patentably distinguishable from the cited reference.

Allowance of the above identified application is respectfully requested.

Respectfully submitted,

Lawrence E. Ashery, Reg. No. 34,515
Attorney for Appellants

LEA/pb

Dated: May 23, 2005

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The Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. **09-0456 (IBM Corp.)** of any fees associated with this communication.

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Lawrence E. Ashery

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VIII. Claims Appendix

1.   A method for visualizing data arrays provided in the form of a plurality of data values, said method comprising the steps of:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

associating each data value of the plurality of data values with one of a plurality of geometric shapes according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

2.   A method for visualizing data arrays provided in the form of a plurality of data values, said method comprising the steps of:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

identifying one of a plurality of numerical attributes associated with each data value of the plurality of data values;

associating each numerical attribute with one of a plurality of visual attributes;

associating each data value of the plurality of data values with one of a plurality of geometric shapes each having one of the plurality of visual attributes, which is consistent with the data value, according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

3.   (Cancelled)

4.   The method according to claim 1, wherein the data arrays of the plurality of data values are the data arrays of conductance matrices.

5.   An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for visualizing data arrays provided in the form of a plurality of data values, the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

associating each data value of the plurality of data values with one of a plurality of geometric shapes according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

6.   An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for visualizing data arrays provided in the form of a plurality of data values, the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

identifying one of a plurality of numerical attributes associated with each data value of the plurality of data values;

associating each numerical attribute with one of a plurality of visual attributes;

associating each data value of the plurality of data values with one of a plurality of geometric shapes each having one of the plurality of visual attributes, which is consistent with the data value, according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

7.   (Cancelled)

8.   The article of manufacture according to claim 5, wherein the data arrays of the plurality of data values are the data arrays of conductance matrices.

9.   A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing visualization of data arrays provided in the form of a plurality of data values, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

associating each data value of the plurality of data values with one of a plurality of geometric shapes according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

10.   A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing visualization of data arrays provided in the form of a plurality of data values, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

identifying one of a plurality of numerical attributes associated with each data value of the plurality of data values;

associating each numerical attribute with one of a plurality of visual attributes;

associating each data value of the plurality of data values with one of a plurality of geometric shapes each having one of the plurality of visual attributes, which is consistent with the data value, according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

11.   (Cancelled)

12.   The product according to claim 9, wherein the data arrays of the plurality of data values are the data arrays of conductance matrices.

13.   A storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform a method for visualizing data arrays provided in the form of a plurality of data values, said method comprising the steps of:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

associating each data value of the plurality of data values with one of a plurality of geometric shapes according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

14.   A storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method for visualizing data arrays provided in the form of a plurality of data values, said method comprising the steps of:

extracting a plurality of data values associated with a mathematical matrix to generate a grid based on the plurality of data values;

identifying one of a plurality of numerical attributes associated with each data value of the plurality of data values;

associating each numerical attribute with one of a plurality of visual attributes;

associating each data value of the plurality of data values with one of a plurality of geometric shapes each having one of the plurality of visual attributes, which is consistent with the data value, according to a predetermined set of rules;

placing said one of the plurality of geometric shapes associated with each data value of the plurality of data values on the grid; and

displaying visual and geometric information placed on the grid to a user in graphical form.

15.   (Cancelled)

16.   The device according to claim 13, wherein the data array of the plurality of data values are the data arrays of conductance matrices.

17.   The method according to claim 1, wherein the data arrays of the plurality of data values are the data arrays of mathematical models of systems.

18.   The article of manufacture according to claim 5, wherein the data arrays of the plurality of data values are the data arrays of mathematical models of systems.

19. The product according to claim 9, wherein the data arrays of the plurality of data values are the data arrays of mathematical models of systems.

20. The device according to claim 13, wherein the data array of the plurality of data values are the data arrays of mathematical models of systems.

IX Evidence Appendix

TECHNICAL DECLARATION (attached)

BU9-97-226

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Cassondra L. Crotty et al.   : Art Unit: 2672
Serial No.: 09/224,696   : Examiner: Chante E. Harrison
Filed: January 4, 1999   : Confirmation No.: 3386
For: METHOD FOR   :
             VISUALIZING DATA   :

TECHNICAL DECLARATION

Assistant Commissioner for Patents
Washington, D.C. 20231

SIR:

I, Daria R. Dooling declare that:

1.   I am one of the inventors named in the above-identified patent application.

2.   I am an Advisory Software Engineer at IBM Corporation and have held my current position since 1995. Included in my responsibilities are software support for product engineering activities that transform chip designs into manufacturable products. This entails distributed numerical methods for failure analysis and yield analysis, and parallel shapes processing of the design for manufacturability purposes. Previously, my responsibilities included system code, such as database managers and network code, for a manufacturing a logistics system.

3.   During my 17 years of employment by IBM Corporation, I have had significant experience with network applications, databases, numerical systems, graphical (shape) processing, and parallel systems. My experience with modeling, manipulating, and solving sparse matrices as part of the chip analysis work, is particularly relevant to the

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technical and patentability issues that have arisen in the prosecution of the above-identified patent application and the subject matter of this TECHNICAL DECLARATION.

4.   I received a Bachelor of Science in Computer Science with a minor in Mathematics from St. Joseph's University. I received a Master of Science in Computer Science from the University of Vermont.

5.   I have made the following presentations and co-authored the following papers:

> *Distributing the Extended Psi Function for the Condition Number Estimator Algorithm,* Dooling - Masters Thesis 1995

> *Parallel Analysis of Integrated Circuit Power Distribution Networks,* Ditlow, Dooling, Gupta, Moore, Moran, Wilkins, and Williams - Ninth SIAM Conference on Parallel Processing for Scientific Computing 1999

> *Integrated Manufacturing and Development IMAD,* Ditlow, Dooling, Moran, Wilkins, and Williams – SuperComputing 1999

> *Parallel Domain Decomposition for Integrated Circuit Design,* Dooling, Moran, and Williams – SIAM Computational Science and Engineering Conference 2000

> *An Algorithm to Manage Computer Resources,* Dooling, Moran, and Williams – SIAM Computational Science and Engineering Conference 2000

6.   The first two presentations and papers are particularly relevant to the technical and patentability issues that have arisen in the prosecution of the above-identified patent application and the subject matter of this TECHNICAL DECLARATION.

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7.   I have been recognized for my accomplishments in the following ways:

Chairperson of the *Domain Decomposition* session of the 2000 SIAM Computational Science and Engineering Conference.

IBM Achievement award in 1988 for contributions to a dealer commission system.

IBM Invention Plateau award in 1999 for four patent application filings

Best Poster award (paper without presentation) in 1999 at the Ninth SIAM Conference on Parallel Processing for Scientific Computing for *Parallel Analysis of Integrated Circuit Power Distribution Networks.*

8.   I am identified as an inventor in two issued U.S. patents and four pending U.S. patent applications, including the above-identified patent application. The U.S. patent most relevant to the technical and patentability issues that have arisen in the prosecution of the above-identified patent application and the subject matter of this TECHNICAL DECLARATION is U.S.5,878,424 *Method and Apparatus for Indexing Patterned Sparse Arrays for Microprocessor Data Cache.* This U.S. patent is relevant in terms of my familiarity with sparse arrays and knowledge of state-of-the-art methods for operating on them.

9.   I am familiar with and understand the contents of the above-identified patent application and the contents of U.S. 6,222,547 to Schwuttke et al.

10.   Schwuttke et al. relates to a three dimensional picture of a space. The system of Schwuttke et al. is a "situation visualizer" that can function in one - (linear), two - (area), or three - (volume) dimensions. This situation visualizer draws the attention of the eye of the user to some activity

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of interest at one or more various points within the three dimensional picture of the space.

11.   Applicants' invention relates to the mathematical representation of a problem. Applicants' invention, in clear contrast to Schwuttke et al., deals with the visualization of the mathematical representation, in grid or matrix form, and not in cyberspace, of a mathematical expression.

12.   A mathematical representation of a problem (i.e., Applicants' invention) is different from a three dimensional picture of a space (i.e., Schwuttke et al.). The purpose and function of Applicants' invention is different from the purpose and function of Schwuttke et al.

13.   Applicants' grid, that is generated as a direct result of data values rather than data values being located in the grid subsequent to formation in an arbitrary manner as in the Schwuttke et al. grid, is different from the Schwuttke et al. grid which is the result of an arbitrary division of cyberspace into smaller spaces that is not based on a plurality of data values, although data values are subsequently located within the grid.

14.   I have been informed by Andrew L. Ney, attorney for Applicants, that the Examiner has acknowledged that the purpose and function of Applicants' invention and the system of Schwuttke et al. are different. In order to understand what is disclosed by Schwuttke et al., one must take into consideration these differences in function and purpose between Applicants' invention and the Schwuttke et al. system.

15.   The claims under rejection call for generating a grid as a direct result of data values. The system disclosed in Schwuttke et al. does not generate a grid as a direct result of data values. Claims 1, 2, 5, 6, 9, 13, and 14 each call for "generating a grid based on a plurality of data values." Claims 3, 7, 11, and 15 each call for "extracting a plurality of data values associated with a mathematical matrix to generate a geometric representation.

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16.   The statement by the Examiner, with respect to
Schwuttke et al., that

> "each block represented in a column of FIG. 5A represents a
> grid that corresponds to a category of data having a plurality of
> associated nominal values. Additionally, a grid is only
> generated in each block where data is represented"

fails to support the Examiner's contention that the system disclosed in
Schwuttke et al. generates a grid as a direct result of data values. In order to
enter data in a grid, as the Examiner acknowledges takes place in Schwuttke
et al., the grid must exist beforehand for the data to be *entered*, which means
that the grid in Schwuttke et al. is not generated as a direct result of data
values.

17.   In Applicants' invention:

(a)   as defined by claims 1, 2, 5, 6, 9, 13 and 14, the grid is
        generated as a direct result of data values, rather than
        data values being located in the grid subsequent to
        formation, in an arbitrary manner, of the grid as in
        Schwuttke et al., and

(b)   as defined by claims 3, 7, 11, and 15 the mathematical
        matrix in Applicants' invention is generated as a direct
        result of data values, rather than data values being
        located in a matrix subsequent to formation, in an
        arbitrary manner, of the matrix as in Schwuttke et al.

18.   By stating "Schwuttke distinctly discloses (col. 6-7 et
seq.) the grid being formed as a result of object classification," the Examiner
has not identified a disclosure in Schwuttke et al. of Applicants' invention as
defined by claims 1 through 3, 5 through 7, 9, 11, and 13 through 15.

19.   Schwuttke et al. does not disclose that a grid is defined
only after data has been entered into the space occupied by the grid at

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selected locations in this space, so that the grid is defined at the time the data is being entered as in Applicants' invention. In the Schwuttke et al. system, as in other prior art grids, the grid is defined at locations within the coordinate system whether or not data has been entered. In the present invention, the grid is defined only at coordinates where the data is located.

20.   The portions of Schwuttke et al. cited by the Examiner (col. 6-7, ll. 8 et seq.; col. 6, ll. 29 et seq.; col. 6, ll. 63 – col., ll. 35; col. 7, ll. 3-5; col. 7, ll. 10 et seq.; col. 7, ll. 20 et seq.; FIGS. 2 and 4-7; col. 10, ll. 35 et seq.; col. 7, ll. 29-35; col. 8, ll. 52 et seq.; col. 5, ll. 37 et seq.;) neither disclose nor suggest:

    (a)   "generating a grid based on a plurality of data values" as called for by claims 1, 2, 5, 6, 9, 13, and 14 or

    (b)   "extracting a plurality of data values associated with a mathematical matrix to generate a geometric representation" as called for by claims 3, 7, 11, and 15

and the Examiner has not pointed out where, in Schwuttke et al., there is a disclosure or suggestion of such features. General statements, such as "Schwuttke distinctly discloses (col. 6-7 et seq.) the grid being formed as a result of object classification" and "Schwuttke et al. and the present invention function the same in that both define a grid where the data is entered," do not indicate to one skilled in the art that Schwuttke et al. discloses: (a) "generating a grid based on a plurality of data values" as called for by claims 1, 2, 5, 6, 9, 13, and 14 and (b) "extracting a plurality of data values associated with a mathematical matrix to generate a geometric representation" as called for by claims 3, 7, 11, and 15.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the

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United States Code and that such willful false statements may jeopardize the
validity of the application or any patent issued thereon.

Respectfully submitted,

Daria R Dooling

Daria R. Dooling

June 11   , 2002

The Assistant Commissioner for Patents is hereby
authorized to charge payment to Deposit Account
No. 09-0456 (IBM Corporation) of any fees
associated with this communication.

I hereby certify that this correspondence is being deposited with
the United States Postal Service with sufficient postage as first
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for Patents, Washington, D.C. 20231 on:

June 12, 2002

Patricia C. Bonella
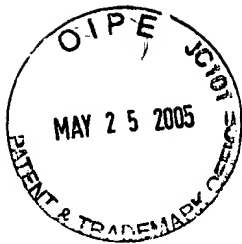
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Cassondra L. Crotty et al.	: Art Unit:	2672
Serial No.:	09/224,696	: Examiner:	Chante E. Harrison
Filed:	January 4, 1999	: Confirmation No.:	3386
For:	METHOD FOR VISUALIZING DATA	: Expedited Procedure	
		: 37 C.F.R. § 1.116	

<u>TECHNICAL DECLARATION</u>

Assistant Commissioner for Patents
Box AF
Washington, DC 20231

S I R :

I, Daria Dooling, declare that:

1. My qualifications to make the comments set forth herein and to draw the conclusions set forth herein are set out in a TECHICAL DECLARATION dated June 11, 2002 that was filed with a RESPONSE dated June 12, 2002.

2. The original disclosure of the above-identified patent application describes *mathematical matrices*.

3. Even through the word "mathematical" does not appear immediately before the word "matrix" in the text of Applicants' specification, one skilled in the art, would readily understand that the original disclosure of the above-identified patent application describes *mathematical matrices*.

4. The statements set forth in Paragraphs 2 and 3 above are supported by the following:

    <u>a</u>.   As set forth in Applicants' specification at page 9, lines 9 through 13

        "If a data array is sparse, for example, then by visualizing the data array it may be possible to observe certain patterns. <u>Sparsity</u> patterns may lead to the choosing of suitable <u>numerical</u> methods, or

reordering schemes with which to treat the data array" (emphasis added)

"Sparsity" is a characteristic of a "mathematical matrix." One applies a numerical method to something that is "mathematical."

b.   As set forth in Applicants' specification at page 12, lines 10 and 11 in connection with the description of an example of the present invention

"Matrices are useful constructs both in theoretical and applied mathematical analysis" (emphasis added).

The example being described, which is also illustrated, is the application of the present invention to electrical network conductance. As indicated, this example of Applicants' invention involves the application of Kirchoff's Current Law (KCL).

"KCL is a conservative law which states that the sum of the currents 'entering' and 'exiting' a node in an electrical network equals zero" (emphasis added)

KCL is a "mathematical" expression.

c.   As set forth in Applicants' specification at page 13, lines 7 et seq

"In matrix form the representation of the circuit of Fig. 5 is denoted by the following equation" (emphasis added)

A "mathematical matrix" is described at this point in Applicants' specification.

d.   As set forth a page 15, lines 9 et seq

"The following matrix-vector equation $G*v = i$ corresponds to such a reorganization of matrix G for the circuit diagrams of Figs. 7 and 8" (emphasis added)

At this point in Applicants' specification, a "mathematical matrix" is described.

5.   Thus, (a) the original disclosure of Applicants' invention is all about mathematical matrices, and (b) one skilled in the art readily recognizes that the description of Applicants' invention in Applicants' original disclosure describes "mathematical matrices."

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted

Daria R. Dooling

April 24 , 2003

The Assistant Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. 09-0456 (IBM Corporation) of any fees associated with this communication.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Box AF, Washington, D.C. 20231 on:

April 30, 2003

Iris M. Cooper